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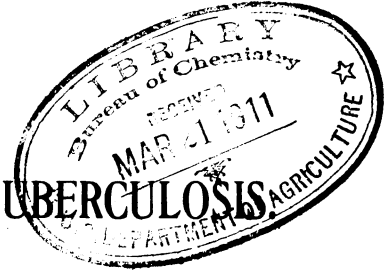
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U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF ANIMAL INDUSTRY.—CIRCULAR 175.

A. D. MELVIN, CHIEF OF BUREAU.

THE CONTROL OF BOVINE TUBERCULOSIS



REPORT OF THE INTERNATIONAL COMMISSION
OF THE
AMERICAN VETERINARY MEDICAL ASSOCIATION,
SEPTEMBER, 1910.



WASHINGTON:
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1911.

LETTER OF TRANSMITTAL.

UNITED STATES DEPARTMENT OF AGRICULTURE,
BUREAU OF ANIMAL INDUSTRY,
Washington, D. C., January 21, 1911.

SIR: I have the honor to transmit herewith the report of an international commission of the American Veterinary Medical Association on the control of bovine tuberculosis, which was presented at the annual meeting of the association at San Francisco in September, 1910. This report, formulated after thorough consideration of the subject by a well-constituted body of men combining scientific knowledge with practical views, forms a valuable contribution toward the solution of the animal tuberculosis problem, and should have great influence in stimulating and directing efforts for the suppression of this disease. To aid in giving publicity to the information and plans thus presented, I respectfully recommend the publication of the report as a circular of this bureau.

Very respectfully,

A. D. MELVIN,
Chief of Bureau.

Hon. JAMES WILSON,
Secretary of Agriculture.

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INTRODUCTION.

The greatest problem confronting the live-stock industry is the increasing prevalence of tuberculosis among cattle and hogs and the necessity of adopting measures for suppressing and controlling this disease. A careful estimate made by the writer for the International Congress on Tuberculosis in 1908 showed that tuberculosis of animals exacts a toll of over \$23,000,000 annually. Of even greater moment than this tremendous economic loss is the sacrifice of human life and the impairment of human health from tuberculosis, almost universally regarded by scientific investigators to be due in some considerable degree to the existence of tuberculosis in animals from which milk and other foods are derived.

No one who is informed on the subject can fail to realize that something should be done to check the rapid spread of tuberculosis among cattle and hogs and to control and eventually to eradicate the disease. As this disease in hogs is nearly always contracted from tuberculous cattle, it is believed that if bovine tuberculosis were suppressed swine tuberculosis would soon disappear; hence our main attack must be directed against the disease in cattle. Efforts have been made for some years to combat bovine tuberculosis, and while some headway has been made in some sections and localities, in general the disease has continued to spread, and on the whole it appears that the progress of the disease has been more rapid than the progress of the work against it. The time has come when something should be done in a more definite, systematic, and practical way and on a larger scale. However difficult may be the task of controlling and eradicating tuberculosis, the problem is constantly becoming more difficult as the infection becomes more widespread. It is much easier to deal now with a disease affecting on the whole about 5 per cent of our cattle than it will be to combat it later if we permit it to spread until it affects 40 or 50 per cent, as is the case in some parts of Europe.

Recognizing the gravity of the situation, the American Veterinary Medical Association at its annual meeting at Chicago in September, 1909, created an international commission to study methods of control of bovine tuberculosis, with instructions to submit a report at the next annual meeting. The commission as first appointed was as follows: Dr. J. G. Rutherford, Hon. W. C. Edwards, Mr. J. W. Flavelle, Hon. W. D. Hoard, Dr. C. A. Hodgetts, Dr. John R. Mohler, Dr. V. A. Moore, Dr. Leonard Pearson, Dr. M. H. Reynolds,

Dr. E. C. Schroeder, Mr. Louis F. Swift, and Dr. Frederick Torrance. The commission first met at Buffalo, N. Y., December 13 and 14, 1909, and organized by electing Dr. Rutherford as chairman and Dr. Reynolds as secretary. Owing to the death of Dr. Pearson and the inability of Mr. Swift to serve, the writer, as president of the association, appointed in their places, respectively, Dr. M. P. Ravenel and Mr. T. W. Tomlinson. Later, at the request of the commission, he also appointed Mr. J. J. Ferguson as a representative of the United States packing industry and Dr. J. N. Hurty as a representative of the medical health officers of the United States. The final personnel of the commission is shown in the list on page 4.

The commission comprised in its membership not only veterinarians, but physicians and representatives of the stock-raising, meat-packing, and dairy interests—scientists, professional men, and practical men of affairs—five from Canada and nine from the United States. The body was thus exceedingly well qualified to consider the subject in a broad way and from the various points of view.

After four meetings of the commission and several conferences of subcommittees, and as a result of thorough consideration of the subject by the members, the commission presented its report at the annual meeting of the American Veterinary Medical Association at San Francisco in September, 1910. This report, which appears in the following pages, recommends and outlines definite plans and policies for the control of bovine tuberculosis. Besides stating important facts about the disease, it points out the necessity for education and legislation, describes methods for handling cattle by breeders and dairymen, and proposes administrative measures to be followed by public officers. It is believed that these recommendations are practical, and that they point the way to more effective warfare against this great common plague of animals and man.

A. D. MELVIN,

President American Veterinary Medical Association, 1909-10.

REPORT OF THE INTERNATIONAL COMMISSION ON THE CONTROL OF BOVINE TUBERCULOSIS.

TO the PRESIDENT OF THE AMERICAN VETERINARY MEDICAL ASSOCIATION :

Owing to the great economic and sanitary significance of animal tuberculosis to the live-stock industry of America and the many and varied factors which must of necessity be accounted with in formulating successful measures for its eradication, the American Veterinary Medical Association, at its meeting in Chicago in September, 1909, appointed the International Commission on the Control of Bovine Tuberculosis. The commission was instructed to study the problem of tuberculosis among cattle and to report at the next meeting of the association upon reasonable and economically practicable methods or systems to be recommended to both officials and live-stock owners for eradicating this great scourge of domesticated animals.

It is recognized that tuberculosis is widely prevalent among cattle and other animals, and that the frequency with which this great evil occurs is increasing rather than declining. As tuberculosis is one of the strictly preventable infections, there is good ground for the belief that through the formulation and enforcement of proper regulations the disease may eventually be entirely suppressed.

The commission has held four meetings, as follows: Buffalo, N. Y., December 13 and 14, 1909; Detroit, Mich., March 1 and 2, 1910; Ottawa, Canada, May 19, 20, and 21, 1910; Madison, Wis., June 27 and 28, 1910; all of which were well attended, very few of the members having on any occasion been absent. The commission begs to present as a result of its labors the following report, which, although brief, will on examination be found to comprise the principal points essential to the promulgation of a comprehensive and practical policy, such as may reasonably be adopted by any governmental body interested in the control of bovine tuberculosis.

It is quite unnecessary, in view of the extensive knowledge already possessed by all who are familiar with the efforts which have hitherto been made to secure control of bovine tuberculosis, to dwell at any length upon the importance of the subject or upon the conditions which led to the formation of the commission.

In view of the personnel of the commission as selected by the American Veterinary Medical Association, and of the fact that so much information on the subject has been made available through the work of similar bodies in other countries and the researches of scientific and practical men in America and elsewhere, the commission has not deemed it necessary to take any evidence either from expert witnesses or others.

The members fully understood that the purpose which their appointment was intended to serve was less the acquisition of new knowledge regarding bovine tuberculosis than the careful study of the knowledge already available and of the thoughts and opinions of those most entitled to speak with authority on the subject.

The conclusions reached in this report are therefore simply the outcome of an earnest and thoughtful consideration of the various modern aspects and phases of the problem, with the object of crystallizing public opinion and so clearing the way for legislative action. They realized also that they could deal with fundamental principles only, and that the details of any policy which they might outline must in each case be worked out by the duly authorized and responsible representatives of the community immediately concerned. They nevertheless deemed it essential to study closely the history of the various efforts hitherto made by such countries throughout the world as have attempted to legislate on the subject. This naturally led to the gradual elimination of all methods other than such as might reasonably be adopted by any community desiring, in the full light of present-day knowledge, to undertake the control of bovine tuberculosis.

It was felt, in view of the prevalence of the disease, especially in some localities and among certain classes of cattle, the difficulty of providing a sufficient number of trained officials, and the large economic questions involved, to say nothing of the enormous expenditure, that it would be unwise, for the present at least, to discuss seriously a policy of universal compulsory testing and slaughter. Such a policy might perhaps be adopted with advantage by a small community, or one in which the disease existed to a very limited extent; but speaking generally, especially in view of past experiences in this line, it was thought better to omit it entirely from the recommendations of the commission.

All other methods of dealing with bovine tuberculosis which have been recommended or tried in various communities were thoroughly discussed, with the object of discarding weak points and adopting such features as might be deemed worthy of a place in the official findings of the commission. Every phase of the subject was in this way fully and freely considered, it being thought best to cover the

whole ground as completely as possible before coming to a definite decision on any one point. In order to minimize still further the risk of omitting from the deliberations of the commission any phase of the question, four committees were appointed at the first meeting to deal respectively with—

1. Education and legislation.
2. Location of tuberculosis.
3. Dissemination.
4. Disposition of tuberculous animals.

The appointment of these committees proved to be of the greatest possible value in concentrating the energies of the various members on those branches of the subject with which they were most familiar, and their reports presented at subsequent meetings enabled the commission to reach satisfactory conclusions much more rapidly than would otherwise have been the case. As a means of furnishing information as to the reasons for these conclusions and the manner in which they were reached, the commission would recommend that the reports of the committees should be published as an appendix to this report.

The commission, recognizing after careful study that the tuberculin test is the fundamental factor in any policy having for its object the control of bovine tuberculosis, decided that a pronouncement to that effect should properly occupy a foremost place.

Based on the information contained in the reports of its committees and on such other information as was brought out in the general discussions of the commission, the following resolutions were adopted for presentation to the American Veterinary Medical Association:

RESOLUTION 1.—DISSEMINATION.

As a general policy to be observed, all contact between tuberculous and healthy cattle and between healthy cattle and stables, cars, etc., which may contain living tubercle bacilli should be prevented. To accomplish this the following specific recommendations are made:

1. There should be no sale or exchange of animals affected with tuberculosis except for immediate slaughter or for breeding purposes under official supervision.

2. That the management of live-stock shows should give preference to cattle known to be free from tuberculosis, either by providing special classes for such cattle or in some other practical way, and should also take every precaution to prevent contact between such animals and those not known to be free from disease.

3. All live-stock shippers should take every precaution to see that cars furnished are thoroughly cleansed and disinfected before use.

RESOLUTION 2.—TUBERCULIN TEST.

1. That tuberculin, properly used, is an accurate and reliable diagnostic agent for the detection of active tuberculosis.

2. That tuberculin may not produce a reaction under the following conditions:

(a) When the disease is in a period of incubation.

(b) When the progress of the disease is arrested.

(c) When the disease is extensively generalized.

The last condition is relatively rare and may usually be detected by physical examination.

3. On account of the period of incubation and the fact that arrested cases may sooner or later become active, all exposed animals should be retested at intervals of six months to one year.

4. That the tuberculin test should not be applied to any animal having a temperature higher than normal.

5. That any animal having given one distinct reaction to tuberculin should thereafter be regarded as tuberculous.

6. That the subcutaneous injection of tuberculin is the only method of using tuberculin for the detection of tuberculosis in cattle which can be recommended at the present time.

7. That tuberculin has no injurious effect on healthy cattle.

RESOLUTION 3.—EVIDENCE FROM TUBERCULIN TEST.

That a positive reaction to tuberculin in any properly conducted test, official or otherwise, in any animal in any herd shall be considered evidence sufficient upon which to declare the herd to be infected.

RESOLUTION 4.—COMPULSORY NOTIFICATION.

That this commission recommends the passage of legislation providing for the compulsory notification by owners and by veterinarians of the existence of tuberculosis in a herd, whether such existence be made known by detection of clinical cases or by the tuberculin test.

RESOLUTION 5.—LOCATION THROUGH SLAUGHTER.

This commission recognizes that the discovery of tuberculosis in animals slaughtered for food purposes furnishes one of the best possible means of locating the disease on the farm, and therefore recommends the adoption of some system of marking, for purposes of identification, all cattle 3 years old and over, shipped for slaughter.

As tuberculosis of hogs is almost invariably due to bovine infection, this recommendation should also be made to apply to hogs of any age shipped for slaughter.

It is further recommended that the discovery of tuberculosis in animals coming under Government inspection should be used, whenever

identification is possible, as a means of locating infected herds and premises. All such cases should be reported to the proper authorities for control action.

RESOLUTION 6.—DISPOSITION OF TUBERCULOUS ANIMALS.

THE COMMISSION PLAN.

1. As a general policy in the eradication of tuberculosis the separation of healthy and diseased animals and the construction of a healthy herd are recommended. In order to accomplish this the following recommendations are made:

(1) If the herd is found to be extensively infected, as shown by the tuberculin test or clinical examination, even the apparently healthy animals in it should be regarded with suspicion until they have been separated from the reacting animals for at least three months. If after the expiration of this time they do not react to the tuberculin test, they may be considered healthy and dealt with accordingly.

It is recommended that a herd extensively infected should not be treated by the method of general separation, but that the construction of a new herd from the offspring only is advisable.

(2) If the herd is found by either or both of the above methods to contain a relatively small proportion of diseased animals, separation of the diseased animals from the healthy animals and the construction of a sound herd from the healthy animals and the offspring of both are advocated.

As a working basis in carrying out these principles, we advise:

(a) That herds containing 50 per cent or more of diseased animals be treated as coming under section (1).

(b) That herds containing under 15 per cent of diseased animals be treated as coming under section (2).

(c) That herds falling between these figures be graded according to the option of the owner.

(d) That it shall be the prerogative of the owner to reject either plan and have his herd dealt with by removal and slaughter of diseased animals, with or without compensation, according to the public policy in operation.

2. That when by any means the officials properly charged with the control of tuberculosis become aware of its existence in a herd to which a policy of slaughter and compensation can not reasonably be applied, such herd must be dealt with by the owner, under Government supervision, on the principle of the separation of all sound animals from those affected. Such separation must be effected by treating the whole herd as diseased, and rearing the calves separately, either on pasteurized milk or the milk of healthy cows, or, when the number of those affected is so small as to warrant such a course, by

the application to the whole herd, from time to time, under official supervision, of the tuberculin test, and the entire segregation of all animals found to react. In the event of any owner refusing or neglecting to adopt either of the above methods, his entire herd to be closely quarantined and sales therefrom to be entirely prohibited.

3. That a policy of compensation be recommended as useful and usually necessary as a temporary measure.

4. That when slaughter is necessary, in order to avoid economic loss, every effort should be made to utilize as far as possible the meat of such animals as may be found fit for food on being slaughtered under competent inspection.

5. The details of the commission plan will be found fully set forth in the appendix to this report.

RESOLUTION 7.—PREVENTION.

1. That with the object of preventing the spread of infection persons buying cattle for breeding purposes or milk production should, except when such purchases are made from disease-free herds which have been tested by a properly qualified person, purchase only subject to the tuberculin test. In order to assist in the proper carrying out of this suggestion, the commission recommends that official authorities should adopt such regulations as will prevent the entry to their respective territories of cattle for breeding purposes or milk production unless accompanied by satisfactory tuberculin test charts.

2. That all milk and milk by-products used as food should be properly pasteurized unless from cows known to be free from tuberculosis.

RESOLUTION 8.—CONTROL OF TUBERCULIN TEST.

That this commission recommends the passage of legislation which will prevent the sale, distribution, or use of tuberculin by any person other than those acting with the full knowledge or under the direction of official authorities.

RESOLUTION 9.—EDUCATION.

As a clear knowledge of the cause and character of tuberculosis among animals, the modes of dissemination, and its significance as an economic and as a public-health problem underlie an intelligent adherence to the principles that must be observed in all efforts for eradication, as well as the establishment of proper cooperation in the great work between physicians, veterinarians, live-stock owners, legislators, and the public generally, it is recommended that a widespread campaign of education be undertaken. To accomplish this end it is recommended that, first of all, a simple pamphlet on bovine tuberculosis be written, in which the language used shall be of such character

that every person of average intelligence shall be able to read it without being mystified by technical terms or phrases. This pamphlet should be published with the indorsement of the American Veterinary Medical Association and the special indorsement and consequent authority of the International Commission on Bovine Tuberculosis Control.

RESOLUTION 10.—PUBLICITY.

In concluding its work, the commission desires to appeal especially to the press—metropolitan, agricultural, and local—to join in the work of extending as much as possible among the people the conclusions here arrived at. The vital importance of the life of farm animals to the welfare of all classes of society needs no argument in its support. The aim and sole purpose which has actuated this commission has been to arrive at the soundest conclusions possible in the light of the best knowledge obtainable.

RESOLUTION 11.—LEGISLATION.

It is recommended that legislation regarding the control and eradication of tuberculosis among domestic animals be made uniform; that the laws of the United States and Canada and other American countries for the admission into America of animals from without be made stringent and as much alike as possible; and that the laws governing the interstate and interprovincial movement of cattle and that between different American countries be harmonized.

The laws governing interstate and interprovincial movement of cattle should be of such character that every State and every province will be free in its eradication work from unnecessary difficulties due to the existence of the disease in other States and provinces.

Legislation is especially required to prevent the various frauds which interfere with the satisfactory use of tuberculin as a diagnostic agent for tuberculosis, as well as for official supervision over all tuberculin sold to be used by veterinarians and others.

RESOLUTION 12.—SANITATION.

In the eradication of tuberculosis it should be kept in mind that, in addition to protecting animals against exposure to tubercle bacilli, it is desirable to make them as resistant to infection as possible. This can be done by stabling them in clean, disinfected, and properly ventilated and lighted barns, giving them abundant clean water and nutritious food, a sufficient amount of daily exercise in the open air, and attending generally to those conditions which are well known to contribute to the health of animals.

The daily removal of manure from stables, and water-tight floors and good drainage in stables are urgently recommended.

Young stock, particularly, should be raised as hardy as possible and should be accustomed to liberal exercise and living in the open.

RESOLUTION 13.—IMMUNIZATION.

That as none of the various methods for the immunization of animals against tuberculosis have passed sufficiently beyond the experimental stage, the commission is unable to indorse any of these for practical use at the present time.

RESOLUTION 14.—ANIMAL TUBERCULOSIS AND PUBLIC HEALTH.

While the members recognize that the subject with which this commission is primarily intended to deal is the control and eradication of tuberculosis among animals as an economic problem, they can not feel satisfied without declaring their recognition of the fact that tuberculosis among animals is also an important public-health problem. Considered as such, the eradication of tuberculosis among animals should have the approval and support of all those persons who are interested in curtailing human suffering and prolonging human life.

RESOLUTION 15.—GENERAL STATEMENT.

The members of the commission wish to be clearly understood that they recognize the limitations of a report necessarily based on actual and not on theoretical conditions. They fully realize that in the event of the policy of which their recommendations form the framework being anywhere adopted even in its entirety, much greater benefit will be derived, at least for some time, from its educative than from its executive features. The control, to say nothing of the eradication, of bovine tuberculosis, is impossible of achievement without the hearty cooperation of all the men who are actually engaged in the cattle industry. In order to secure this cooperation, it will doubtless be necessary in most communities to carry on an active and prolonged educational campaign.

It is apparent that in the dissemination of practical and reliable information regarding the disease it will be possible to employ a very large variety of methods. Many of these methods, such as bulletins, lectures, and actual demonstrations of disease, having already been found valuable, will doubtless continue to be largely used. It must not be forgotten, however, that in this, as in any other educative process, a measure of disciplinary control is essential to success. Needless to say, such control can be secured only by the passage of legislation which, while clear and comprehensive, must at the same time be sufficiently conservative to avoid exciting alarm or arousing antagonism on the part of owners, especially of valuable herds. The

best law ever framed can be made an utter failure by stupid or injurious administration, while, on the other hand, the most drastic legislation can be rendered acceptable if enforced with reasonable tact and diplomacy. Provided, therefore, that these qualities, combined with integrity, thoroughness, and determination, are available for administrative purposes, the members of the commission are convinced that the enforcement of a law based on their recommendations will prove to be by far the most powerful and effective educational agency which could possibly be employed.

In concluding its report the commission would suggest that the association should make such provision as may be necessary to carry on the work either by continuing the commission as at present constituted or with such changes in the personnel as may be considered desirable.

WM. C. EDWARDS.

J. N. HURTY.

E. C. SCHROEDER.

J. J. FERGUSON.

J. R. MOHLER.

T. W. TOMLINSON.

J. W. FLAVELLE.

V. A. MOORE.

F. TORRANCE.

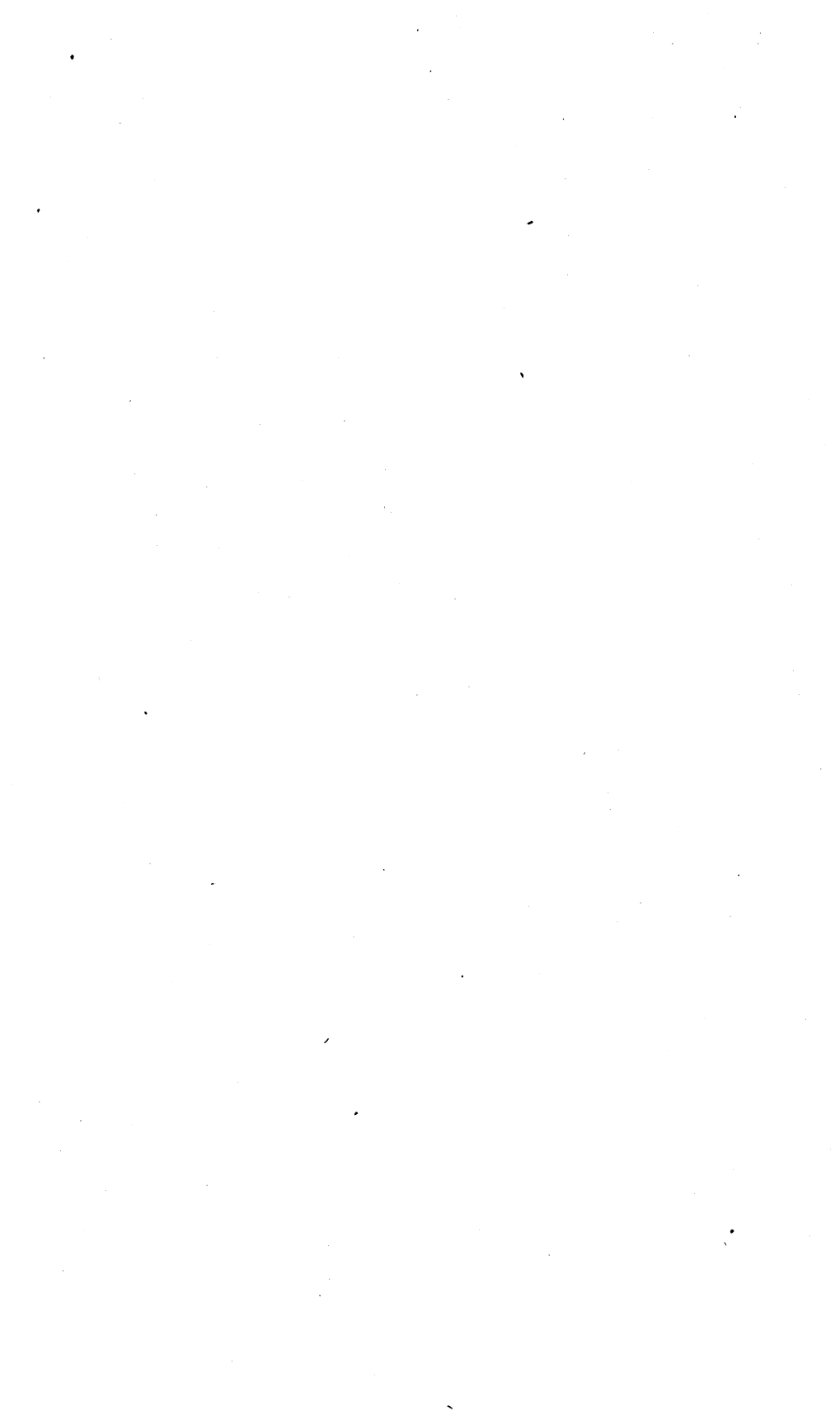
W. D. HOARD.

MAZŮCK P. RAVENEL.

CHAS. A. HODGETTS.

J. G. RUTHERFORD, *Chairman.*

M. H. REYNOLDS, *Secretary.*



APPENDIX.

A. REPORT OF COMMITTEE ON EDUCATION AND LEGISLATION.

The subcommittee on education respectfully submits the following:

Bovine tuberculosis has become widely distributed throughout the United States and Canada, and it has been determined that efficient systems or methods for its eradication and prevention, either under the supervision of the State or Nation or by the cattle owners themselves, are of necessity based on a knowledge of the nature of the disease and its means of dissemination.

Experience has shown that the principles of eradication and prevention may be successfully applied by individual owners of infected cattle, independent of state assistance. Such individual aid is essential in conjunction with state or national assistance in the prompt eradication of the disease from infected herds and the prevention of its entry to noninfected herds.

Therefore it is the sense of this committee that every possible means should be employed for educating the cattle owners and the general public concerning the nature of tuberculosis, the care and precautions necessary to prevent its entrance into herds already free from the disease, and in methods for its eradication from herds where it now exists.

Further, this committee approves of the following methods for instructing laymen, practicing veterinarians, practitioners of human medicine, and health officers in the nature and control of bovine tuberculosis, namely:

1. By the publication in agricultural and dairy papers of short, accurately and carefully prepared articles on bovine tuberculosis.

2. By publication of appropriate articles on bovine tuberculosis in veterinary, medical, and sanitary papers and journals.

3. By recommending to agricultural societies, granges, and directors of farmers' institutes and unions, and especially those interested in creameries and cheese factories, that lectures on bovine tuberculosis, its nature and control, be made a part of their programs, and that so far as practicable demonstrations be held.

4. That those having in charge the arrangement of town, county, and State fairs be requested to provide lectures on bovine tuberculosis, and if practicable to hold public demonstrations, at their annual meetings.

5. By placing a copy of the report of the commission in the hands of the deans or directors of all veterinary and medical colleges and schools of sanitary science in the United States and Canada, with recommendations that special emphasis be placed in their courses of instruction on the nature of bovine tuberculosis and methods for its control.

6. That a pamphlet dealing with the nature of bovine tuberculosis and methods for its control should be written in language intelligible to the layman. This pamphlet should have the approval of this commission and the indorse-

ment of the American Veterinary Medical Association. It should be published for free distribution.

7. That departments of agriculture, State veterinarians, live-stock sanitary boards, and others interested in the official control of bovine tuberculosis be requested to promote as much as possible the educational features of their work, with the object of obtaining more support and cooperation from cattle owners.

The methods suggested for carrying out an educational propaganda are not to be considered at the exclusion of any and all other ways by which the public may become informed on the nature of bovine tuberculosis, its great economic importance, and the necessity for an intelligent and united effort on the part of cattle owners and those having charge of the control of animal diseases to eradicate this great scourge.

The committee is of the opinion, from the history of the legislation regarding bovine tuberculosis in those States and counties which have attempted to deal radically with the problem, as well as from the special information which has been furnished by this committee to its members, and the light thrown upon the subject in the discussions at its several meetings, that in order to avoid friction and failure all important legislation with reference to tuberculosis must be prepared with due consideration for the condition of public sentiment and information on this subject; that tuberculosis-control work should be developed in a progressive way; that tuberculin tests made at a distance for public recognition (for example, in other States or foreign countries) can only be done satisfactorily by official veterinarians; that the Delepine or Manchester plan of tuberculosis-free areas gradually extended seems worthy of cautious trial.

M. H. REYNOLDS, *Chairman.*

W. D. HOARD.

J. G. RUTHERFORD.

SUPPLEMENTAL REPORT BY W. D. HOARD.

MR. PRESIDENT AND GENTLEMEN OF THE COMMISSION:

I place a high value on the work this commission may do if performed wisely, in shaping the conviction and purpose of the people of Canada and the United States concerning the prevention and control of bovine tuberculosis.

As yet that conviction is but little more than an ill-defined dread of something not clearly understood by the great mass of farmers. Added to this dread is a hope stronger yet that the evil is not as great as has been asserted; that it is a scare that will soon pass over. As yet in the minds of farmers and breeders generally, especially in those localities where demonstration work has not been had, there is a strong undercurrent of conviction that all this talk about the disease is an interested plea of the veterinarians, that the trouble does not amount to much if the doctors and editors would hold their tongues and pens. Just as long as this bank of fog exists it will control all legislation and individual effort to get rid of the difficulty. At the bottom of the matter is a widespread ignorance on the part of farmers as to the danger that threatens them; it is difficult to arouse them out of their conservatism, for as yet all they know about it is talk. The conservatism of intelligence is vastly different from that which exists because of a lack of knowledge. The first demands more light, the latter dreads light.

From what I have seen in Wisconsin I am convinced that the most powerful aid to that action against the disease which this commission is so anxious to bring about is public demonstration. One animal slaughtered before a body of farmers, and the diseased parts exposed to their plain view, is worth more to foster conviction and inspire effort than anything else that can be done. If the Federal and State governments would devote means for this demonstration work it would prove a most powerful educator. Public agitation in farmers' gatherings and the talk of the agricultural press is useful mainly in keeping alive an interest in the subject. But we must remember that with the majority of men—a large majority—"seeing is believing."

I believe, therefore, that this commission should use its influence in urging legislation by municipalities and state and national legislatures for the spread and support of this demonstration work. Great care must be exercised, however, to select only such animals as will amply show forth the ravages of the disease. The great progress we have made in legislation in Wisconsin and in securing widespread acquiescence in the use of the tuberculin test would never have come had it not been for a large number of public demonstrations held in various parts of the State.

We have gone as far as this in legislation: After December 1, 1910, all animals sold for breeding or milking purposes must first be tuberculin tested. This, I believe, is a step further in advance than has been taken by any other State. It shows well the tone and temper of our farmers and the work which has been done to acquaint them with a true understanding of the situation. It is needless for me to say that if they are for the law, or any law, it goes; if they are against it, it is at best a dead letter. It is worth a great deal in the promotion of such objects to have a live-stock sanitary board in a State that will take hold and lead in this work. In too many instances these organizations are purely negative in their influence, and so nothing is done. There is a notable lack of funds to bear the expense of demonstration work. The farmers everywhere would willingly be taxed for its support. Municipalities could well afford to have such expense for the sake of the education it would afford to consumers of meat and dairy products.

In conclusion, I would urge upon this commission that special emphasis be placed upon the promotion of public exhibitions of diseased cattle before and after slaughter, as the most powerful means of education concerning the nature and danger of bovine tuberculosis.

W. D. HOARD.

B. REPORT OF COMMITTEE ON LOCATION OF TUBERCULOSIS IN CATTLE.

Your committee on the location of tuberculosis in cattle desires to submit the following as its report upon this subject.

Though we are all agreed that no method for detecting tuberculosis in cattle equals the tuberculin test, we are forced to recognize that the universal application of the test under existing conditions is practically and economically impossible. The number of cattle to be tested, for example, is so great that if all the available veterinarians and all such other persons as may be trusted to make tuberculin tests should be started on this work at once and kept at it, years would pass before all the cattle in the United States and Canada could be tested even a single time. Consequently our efforts to locate tuberculosis among cattle should depend primarily upon other means than the tuberculin

test. The tuberculin test should be regarded as having only an incidental value in the systematic work of locating tuberculosis, and as being of preeminent importance when we undertake the determination of the extent to which the disease is prevalent at any point in any herd where it has been located by other means or incidentally by the tuberculin test.

In the order of seeming importance the means of location may be placed as follows:

I. NOTIFICATION.

A law should be enacted requiring any and every person having knowledge of the existence of a case of tuberculosis among cattle to report the same without delay to some proper designated authority. Such a law would be practically equivalent to the obligatory reporting of all clinical cases of tuberculosis, which must be recognized as the most serious disseminators of tubercle bacilli and propagators of tuberculosis. Since all cases of tuberculosis that are centers from which infection is being scattered gradually become clinically recognizable, obligatory notification of all recognized cases of tuberculosis would alone in the course of a few years locate the majority if not all badly diseased herds. It would certainly locate tuberculous cattle and herds faster than they can be handled for some years to come.

II. EVIDENCE THROUGH MEAT INSPECTION.

An effort should be made to trace tuberculous animals back from slaughterhouses to the farms from which they were derived. This is important, because if the well-conditioned animals which go to slaughter for meat are tuberculous it is probable that among the animals retained on the farm some active disseminators of tubercle bacilli exist, which are retained at the farm either through ignorance or a false idea of economy.

Meat inspection has already done much to establish infected areas from which tuberculous animals have been sent to market. At present, however, it is difficult to trace animals to the farms from which they were shipped, and some method of identification by means of which any animal found on the killing floor to be tuberculous can be traced to its place of origin is greatly to be desired. A Federal law requiring appropriate tagging, branding, or otherwise identifying all hogs and dairy cattle moving interstate for slaughter, and state laws compelling similar identity marks for these animals moving within the State for slaughter, would be the means of locating a large proportion of the centers of tuberculosis. Experimental work of this character which has been carried out in the past has given very interesting results. For instance, when the occurrence of tuberculosis among hogs at an abattoir is followed up by a tuberculin test of the cattle on the home farm it practically always discloses tuberculosis among these animals. Like much other evidence, this encourages us to believe that tuberculosis among hogs will cease to exist as an economically important problem as soon as we succeed in controlling the bovine source of tubercle bacilli.

III. THE TUBERCULIN TEST.

When the tuberculin test is applied to cattle for any purpose it should be clearly understood that the reacting animals are to be regarded in every sense of the word as recognized cases of tuberculosis which under an obligatory notification law must be reported at once to the proper authority. In this way

tuberculin will serve as an important means of locating tuberculosis among cattle that are tested for reasons like the following:

1. To obtain healthy animals for export.
2. To make sure that animals imported are free from tuberculosis.
3. To make sure that animals intended for interstate movement are free from tuberculosis. And here we would like to suggest that the States should protect themselves as much as possible against bovine tuberculosis by insisting that no new cattle shall be brought in until they have been shown by the tuberculin test to be free from tuberculosis. The time, we may hope, is not far off when even breeders of exceptionally fine strains of blood will begin to realize that the very best blood coupled with tuberculous infection is an article to be shunned, not because we wish to imply that tuberculosis is hereditary, but because we know how readily it is conveyed from animal to animal by contact.
4. To obtain milk from animals shown in the most conclusive manner to be free from tuberculosis, irrespective of whether the milk is intended for special certification or for more general or regular city use.
5. To satisfy an owner of cattle that his herd is free from tuberculosis, or to give him the information he needs to clean his herd from disease.

In whatever way the tuberculin test is applied, or for whatever purpose, all positive reactions obtained should be regarded as placing the reacting animal in the category of recognized cases of tuberculosis, which must be reported under a notification law.

As the newer methods of applying tuberculin for test purposes have not been found to be as reliable as the older subcutaneous method, they can not be advocated. The ophthalmo and cutaneous tuberculin tests may have a value in some special cases, as, for example, where doubt exists about the reliability of a subcutaneous test because an animal may have been subjected to some pernicious manipulation. In this sense these later modes of applying tuberculin should be kept in mind.

IV. EXAMINATION OF MATERIAL FROM CATTLE AND HERDS.

The valuable evidence that may be obtained as to the location of tuberculosis through the examination of milk, cream, butter, centrifuge slime, and other products and materials from cattle should not be neglected, especially when these examinations are made by health officers and others for the protection of public health and are followed up by the inspection of the animals and of the character of their environment as a routine procedure. Such inspections are constantly becoming more prevalent in various sections of the United States and Canada.

V. MOST IMPORTANT SOURCES OF ANIMAL TUBERCULOSIS.

Tuberculosis as it exists among the domestic animals of America to-day undoubtedly owes its primary introduction to the cattle of improved breeding that have been imported from European lands from time to time in the past for the purpose of improving the native stock of the country. No particular breed is to be incriminated in this charge, as several of the most prominent and popular breeds have been found guilty of furnishing tuberculous individuals to the best American herds on repeated occasions. The knowledge that infection has taken place from these sources in the past affords us a valuable indicator of the points where search should be made in our efforts to detect the cases of tuberculosis that exist to-day upon the farms of the country. First of all, then, attention may be directed toward all herds of pure-

bred cattle, whether of beef or dairy type, especially to those from which cattle are sold either by private or public sale, and from which cattle are thus distributed to various parts of the country; also to herds from which members are exhibited at fairs and exhibitions, and herds which keep males for custom service.

In addition to these herds of pure-bred cattle, there are many others to which well-bred stock has been added for the purpose of grading up and improving the quality of the individuals of the herd.

These in some instances have received the infection of tuberculosis with the new animals from which such great benefits had been expected, and these herds of well-graded cattle should also be regarded with suspicion until they have been proved to be free of tuberculosis. Next in order should come all dairy cattle, but the methods by which the disease may be located in these herds has been discussed above.

JOHN R. MOHLER, *Chairman.*

J. W. FLAVELLE.

C. A. HODGETTS.

C. REPORT OF COMMITTEE ON DISSEMINATION OF BOVINE TUBERCULOSIS.

The subcommittee on the dissemination of bovine tuberculosis respectfully submits the appended report on the means for the dissemination of this disease, based on the present knowledge of the life history of the tubercle bacilli. The possible means for the dissemination of this disease are enumerated as follows:

1. The introduction into a sound herd of an animal or animals affected with tuberculosis of (a) those with open tuberculosis, (b) those in which the disease is in a period of incubation, and (c) those in which the lesions are temporarily arrested.

The last group will not transmit the infection speedily, and possibly may never do so. The first group is certain to spread the virus.

2. By feeding calves milk, whole or separated, buttermilk, or whey, where the milk has come from tuberculous cows.

3. By bringing cattle suffering from open tuberculosis into contact with healthy ones at fairs, cattle shows, and other exhibitions.

4. By shipping healthy cattle in cars not thoroughly disinfected, recently occupied by tuberculous cattle.

5. By placing healthy cattle in stables that have not been thoroughly disinfected and which were recently occupied by tuberculous animals, as frequently happens with the change of farm ownership or tenants.

6. Tuberculous animals which do not react to tuberculin, such as those in the period of incubation or latent cases, but which develop active tuberculosis later, are frequently carriers of the virus, although bought and sold as sound animals. These can not at present be differentiated from sound animals. Therefore all cattle coming from herds in which the disease exists should be considered as suspicious. The sound herd is the unit to deal with.

7. Tubercle bacilli may be transmitted by tuberculous cattle running in a pasture to healthy cattle in adjoining pastures where they are separated by a fence of such nature that the cattle may get their noses together.

8. Tuberculosis in cattle rarely, if ever, occurs through infection from (a) man, either directly or as a carrier of bovine tubercle bacilli, (b) from other species of animals, or (c) by infection from the droppings of crows, buzzards,

or other birds or carnivorous animals that have fed upon the carcasses of tuberculous cattle.

It is the opinion of this committee that bovine tuberculosis is spread largely through the introduction of tuberculous cattle into sound herds, by the feeding of calves with infected milk or milk products, by exposing sound animals to infected ones at fairs or other cattle shows, and by exposing them to infected cars and stables. There are other ways in which now and then it is possible that an animal may become infected, but the means of dissemination mentioned in this paragraph are those to be guarded against in formulating efficient methods of control.

V. A. MOORE, *Chairman.*

E. C. SCHROEDER.

M. P. RAVENEL.

D. REPORT OF COMMITTEE ON DISPOSITION OF TUBERCULOUS ANIMALS.

Your committee on the disposition of tuberculous animals begs to submit the following report:

In the work of control and eradication of tuberculosis in animals it is, first of all, of the utmost importance to establish the presence of the disease in all the affected cattle, since only by such a procedure will it be possible to guard the healthy and newly born animals from infection.

Fortunately we are in a position to determine with considerable certainty the vast majority of occult cases of tuberculosis in cattle, even the incipient cases, with the aid of tuberculin, and the clinical cases by physical examination. This alone constitutes a great advantage in the work of suppression of the disease. The tuberculin test should therefore be considered as a very important step in the eradication of tuberculosis. As a matter of fact, all the recognized authorities on the subject are agreed on this point.

Once the tuberculous animals are recognized, consideration must be given to the most suitable and economical way of eradicating the disease from the herd. This naturally brings up the question of the disposition of the tuberculous animals, and in adopting any particular method one should be guided by the extent of the infection of the herd, the quality of the affected animals, the sanitary condition of the premises, and, last but not least, the owner's intelligence and knowledge of the subject. The latter information is necessary to determine if reliance can be placed on the owner to carry out minutely all the details which are essential in executing any particular method of eradication that may be decided upon.

The owner's cooperation in this work is without doubt a very essential feature of this great task. For this reason a campaign of education of the farmers and stock raisers relative to the control of tuberculosis, in which all the advantages of the eradication of tuberculosis must be impressed on them, would greatly facilitate this important campaign. It is a well-known fact that any voluntary method of suppression by the herd owners themselves would bring about better and quicker results than when compulsory measures are enforced upon them by legislative enactments. Nevertheless, the time has arrived when a campaign looking toward the control of this disease should be entered upon by the General Government as well as the State and the Province. This campaign must reach in the first place all the clinical pulmonary forms of tuberculosis; then tuberculosis of the udder, intestines, and uterus.

Having removed these exceedingly dangerous cases, the balance of the tuberculous herd may be treated by the Bang system, which consists in the establishment of two herds of cattle, one containing the animals which reacted to tuberculin and the other those that proved to be healthy. Each class of cattle is kept entirely separate from the other, in different stables when possible, and under the care of separate attendants, using separate utensils. The calves born of diseased cows are removed from their mothers at birth and placed in the stable with the healthy animals, where they are reared upon the milk of healthy cows or upon other milk which has been properly pasteurized. In this way the healthy portion of the herd constantly increases, while the diseased animals are disposed of as rapidly as may be deemed necessary, until finally all of them are gone and the remaining herd is composed entirely of healthy cattle. The tuberculin test is applied to the healthy herd at regular intervals, annually or semiannually, in order to detect any cases of latent tuberculosis or recent infection which may appear.

A modification of the Bang system is Ostertag's method of suppressing tuberculosis. This system demands only a clinical examination of the original herd, with the elimination of all open cases of tuberculosis. The calves from the remaining cows are immediately removed and brought up on pasteurized milk in the same manner as in the Bang system, and a new herd is thus established from the young stock. Healthy nurse cows could be used for these calves instead of feeding them on pasteurized milk. The tuberculin test is applied to this new herd at stated intervals in order that any cases of tuberculosis which may develop therein may be discovered promptly.

Neither of these systems, however, has met with much favor in this country, as it requires a considerable length of time and care to create a herd free from tuberculosis by either of them. Nevertheless the inauguration of Bang's or Ostertag's method in herds of valuable animals, whether they be dairy or beef breeds, is unquestionably of an economic value, and in such cases either of these systems should be encouraged. On the other hand, in ordinary beef or dairy herds the practice of Bang's or Ostertag's method in this country has not met with much encouragement, owing to the extraordinary supervision, time, and labor, as well as the loss of market milk from the reacting cows, which it involves.

In such herds the best ultimate results have thus far been obtained by the obligatory disposal of all the clinically affected cows, and giving the dairyman the alternative either to pasteurize the milk from the remainder of his herd or to be forced to refrain from selling the raw milk from the infected herd at all. In case he adopts the former method, the herd composed of diseased and healthy cattle should be placed in quarantine under the supervision of sanitary authorities, and no sales should be permitted from the herd excepting for immediate slaughter. The alternative method will compel him to dispose of his tuberculous animals in the case he refuses to pasteurize the milk.

The suppression of tuberculosis could be greatly facilitated and the co-operation of many of the herd owners could be gained by a provision by which a certain percentage of indemnity could, at least for a term of years, be paid for the condemned animals. The scale for such an indemnity should be arranged in accordance with the final disposition of the carcass under competent inspection.

Another method of eradication should receive serious consideration as being of value in some localities. This is known as the Manchester system, which is either the Ostertag or Bang system applied to localized areas or even individual farms, from which centers the work progresses to surrounding or neighboring districts and farms.

Inasmuch as the animals affected with clinical tuberculosis are the greatest sources of danger in the dissemination of the disease, compulsory reporting of such cases should be inaugurated by the State, as is now done in many places in the control of human tuberculosis. Mandatory reporting of these cases and their prompt slaughter are very essential, as only by the elimination of these exceptionally dangerous cases can it be hoped to take up all the other details by which a successful control of bovine tuberculosis may be accomplished.

In conclusion your committee, having regard to the disposition of purebred cattle, or valuable animals kept for either breeding or dairy purposes, would strongly recommend a system requiring the removal of all clinically tuberculous animals from the herd, the segregation of all calves from the remaining cows in order to establish a new clean herd, the use of tuberculin-tested nurse cows or pasteurized milk for these calves, and the periodic application of tuberculin to this newly established herd, as the only thoroughly reliable one.

W. C. EDWARDS, *Chairman.*

JOHN R. MÖHLER.

FREDERICK TORRANCE.

E. THE COMMISSION'S RECOMMENDATIONS ON ERADICATION—A COMPOSITE OF THE METHODS OF BANG AND OTHERS.

The commission, after stating the known facts regarding the nature of tuberculosis and enumerating the principles to be observed in its prevention and eradication, recommends the following plan of procedure. It is recognized that in several points there are opportunities, in order to meet individual needs, to change or modify the directions herein given. It is understood, however, that whenever such modifications are made they should conform in the greatest detail to the principles laid down in the report of this commission. The plan has for its purpose the conservation of the herd whenever that is possible.

The control of bovine tuberculosis involves a definite procedure under two distinct and different conditions, namely, (1) where a herd of cattle is free from tuberculosis and it is to be kept so, and (2) where one or more animals in the herd are infected and the purpose is to eradicate the disease and establish a sound herd.

PROCEDURE UNDER FIRST CONDITION.

The prevention of tubercular infection in cattle free from tuberculosis consists simply in keeping tuberculous cattle or other animals away from the sound ones—in keeping tuberculous animals out of pastures, sheds, or stables where the sound ones may be kept. Healthy cattle should not be exposed to possible infection at public sales or exhibitions. Raw milk or milk by-products from tuberculous cows should not be fed to calves, pigs, or other animals. Cars that have not been thoroughly disinfected should not be used for the transportation of sound cattle. Cattle that are purchased to go into sound herds should be bought from healthy or sound herds only.

PROCEDURE UNDER SECOND CONDITION.

The eradication of tuberculosis from infected herds requires for conservation of the herd different procedures according to the extent of the infection. For a guide to the control of the disease, tuberculous herds may be divided into three groups, namely:

I. Where 50 per cent or more of the animals are infected.

II. Where a small percentage (15 per cent or less) of the animals are affected.

III. Where a larger number (15 to 50 per cent) of the animals are diseased. In eliminating tuberculosis from infected herds the following procedure is recommended:

Group I.

Herds where a tuberculin test shows 50 per cent or more of the animals to be infected should be treated as entirely tuberculous. The procedure here is as follows:

1. Eliminate by slaughter all animals giving evidence of the disease on physical examination.

2. Build up an entirely new herd from the offspring. The calves should be separated from their dams immediately after birth and raised on pasteurized milk or on that of healthy nurse cows. This new herd must be kept separate from any reacting animals.

3. The young animals should be tested with tuberculin at about 6 months old, and when reactors are found at the first or any subsequent test the others should be retested not more than six months later. When there are no more reactors at the six months' test annual tests should thereafter be made. All reacting animals should at once be separated from the new herd, and the stables which they have occupied thoroughly disinfected.

4. When the newly developed sound herd has become of sufficient size the tuberculous herd can be eliminated by slaughter, under inspection, for beef.

Group II.

1. The reacting animals should be separated from the nonreacting ones and kept constantly apart from them at pasture, in yard, and in stable.

(a) *Pasture.*—The reactors should be kept in a separate pasture. This pasture should be some distance from the other, or so fenced that it will be impossible for the infected and noninfected animals to get their heads together.

(b) *Water.*—When possible to provide otherwise, reacting cattle should not be watered at running streams which afterwards flow directly through fields occupied by sound cattle. The water from drinking troughs used by infected animals should not be allowed to flow into stables, fields, or yards occupied by sound animals.

(c) *Stable.*—Reacting cattle should be kept in barns or stables entirely separate from the ones occupied by the sound animals.

2. Calves of the reacting cows should be removed from their dams immediately after birth. Milk fed these calves must be from healthy cows, otherwise it must be properly pasteurized. These calves should not come in contact in any way with the reacting animals.

3. The nonreacting animals should be tested with tuberculin in six months, and when reactors are found at the first six months, or any subsequent test, the others should be retested not more than six months later. When there are no more reactors at the six months' test, annual tests should thereafter be made. All reacting animals should at once be separated from the new herd and the stables which they have occupied thoroughly disinfected.

4. The milk of the reacting animals may be pasteurized and used.

5. Any reacting animals which develop clinical symptoms of tuberculosis should be promptly slaughtered.

6. An animal that has once reacted to tuberculin should under no circumstances be placed in the sound herd.

7. As soon as the sound herd has become well established infected animals should be slaughtered under proper inspection.

Group III.

Herds that come within this group should be dealt with either as in Group II, where the herd is separated, or as in Group I, where all of the animals are considered as suspicious, and an entirely new herd developed from the offspring.

GENERAL PRECAUTIONS.

In *all* cases animals that show clinical evidence of the disease should be promptly eliminated. They should be destroyed if the disease is evidently far advanced; if not, they may be slaughtered for food under proper inspection.

All milk from tuberculous cows that is used for food purposes should be thoroughly pasteurized. This means that it must be heated sufficiently to kill or to render harmless any tubercle bacilli that may be present in it. For this it is necessary to heat the milk for 20 minutes at 149° F., or for 5 minutes at 176° F. It is important that pails or other utensils used in carrying the unpasteurized milk should not be used, unless previously sterilized, for storing the milk after it is pasteurized.

When diseased animals are found, the stables from which they are taken should be thoroughly cleansed and disinfected. To accomplish this all litter should be removed; floors, walls, and ceilings carefully swept, and the floors, together with mangers and gutters, thoroughly scrubbed with soap and water. Thorough cleaning before the application of the disinfectant can not be too strongly emphasized. After cleansing, the disinfectant should be applied. A 5 per cent solution of carbolic acid, a 1 to 1,000 solution of corrosive sublimate, or a 4 per cent solution of sulphuric acid may be used. When the stable can be tightly closed, formaldehyde gas, properly used, is reliable and satisfactory.

If tuberculous cattle have been kept in a small yard, the litter should be removed, the surface plowed, and the fencing and other fixtures thoroughly cleansed and disinfected.

